

Preliminary investigation on ^{137}Cs migration into Japanese chestnuts

Mamoru Sato*, Daisuke Takata and Kenji Ohse

Faculty of Food and Agricultural Sciences, Fukushima University

*Corresponding author: florpomofores2105-1804@coral.plala.or.jp

Examination 1: ^{137}Cs concentration in bur, shell, pellicle and cotyledon with embryo (edible portion) of wild Japanese chestnuts (*Castanea crenata*) growing in the Fukushima University campus. Five locations were selected for study. Matured cupules dropped from adult trees at two to four locations from 2016 to 2018 were collected. In 2020, matured cupules were collected at five locations. ^{137}Cs concentration in each part was measured after drying at 80°C. As a result, measured values of ^{137}Cs concentration in edible portions collected in 2020 were from 7.1 to 40.2 Bq/kg DW except for one location. However, 234 Bq/kg DW was detected in edible portions at the other one location where the tree recorded a higher concentration than 200 Bq/kg DW also in both 2017 and 2018. Only at the location where the soil was dressed, ^{137}Cs concentration in edible portions decreased with time due to the one-component exponential function, and the effective half-life was 2.8 years. **Examination 2:** The migration rates into each part of cupule of Japanese chestnuts cultivar 'Tanzawa' via bark of fruiting mother shoots. One 'Tanzawa' tree (over 30 years old) planted in an orchard in Arai, Fukushima City was used for the study. Seven fruiting mother shoots were randomly selected and 1 mL of dissolved ^{137}Cs solution (8.53 Bq/mL) extracted from moss was pasted over bark with a writing brush on April 16 and 17 in 2020 prior to sprouting. Flowering spikes and matured cupules were collected. ^{137}Cs concentration was measured in the same way as Examination 1. The difference in ^{137}Cs concentration between the treated and untreated shoots was multiplied by weight to obtain the amount of absorbed ^{137}Cs , and the percentage of the amount of absorbed ^{137}Cs to the amount of attached ^{137}Cs was represented as the migration rate from bark of the treated shoots. As a result, the migration rate from the bark of the fruiting mother shoot prior to sprouting was $2.0 \pm 0.8\%$ (mean \pm SD) into the flower spikes and $0.41 \pm 0.41\%$ into the edible part of the matured cupules. In addition, it was found that the ^{137}Cs concentration ratio between bur, shell and edible part was 2.2: 0.8: 1.0 for wild chestnut and 2.1: 1.1: 1.0 for 'Tanzawa'.

Keywords: ^{137}Cs contamination prior to sprouting, chestnut trees in the Fukushima University campus, ^{137}Cs migration rate, cupules

ニホングリの ^{137}Cs 動態に関する予備的調査

佐藤 守*、高田大輔、大瀬健嗣

所属機関 福島大学農学群食農学類

*責任著者: florpomofores2105-1804@coral.plala.or.jp

ニホングリ (*Castanea crenata*) には、栽培種とその原種で、山野に自生するヤマグリ (シバグリ) がある。試験1. 2016年から2018年までと2020年に福島大学支援棟入口 (A)、支援棟東 (B)、農学群研究棟西 (C)、合同研修施設裏 (D)、野球場脇自然林 (E) に自生するヤマグリ殻斗の ^{137}Cs 濃度を調査した。2016年から2018年は上記の内、2~4地点の成木から成熟期の9月下旬に落下した殻斗を採取した。2020年は5地点から採取した。殻斗は毬、鬼皮、渋皮および子葉・胚 (可食部) に分け、80°Cで乾燥後、Ge半導体検出器にて ^{137}Cs 濃度を測定した。2020年のヤマグリ可食部の ^{137}Cs 濃度はB地点を除き、7.1 Bq/kg DW~40.2 Bq/kg DWであったが、B地点は234 Bq/kg DW (119.3 Bq/kg FW) で2017年、2018年に続き3か年ともに200 Bq/kg DWを超えた。造成土が客土されたC地点のみで一成分指数関数に近似した経年推移を示し、実効半減期は2.8年であった。試験2. 2020年に発芽前の栽培グリ結果母枝表皮から殻斗への移行率を検証した。福島市荒井の農地に植栽された'丹沢' (30年生以上) 1樹を供試した。結果母枝7本を任意に抽出し、2020年4月16日、17日にコケから抽出した溶存態 ^{137}Cs 液 (8.53 Bq/mL) 1mLを毛筆で塗布した。開花期および成熟期に花穂および殻斗を採取し、上記と同様の方法で ^{137}Cs 濃度を測定した。塗布枝と無処理枝の ^{137}Cs 濃度の差分に重量を乗じ ^{137}Cs 吸収量とした。 ^{137}Cs 付着量に対する ^{137}Cs 吸収量の百分率を処理枝からの移行率とした。発芽前の栽培グリ結果母枝表皮からの移行率は、花穂で $2.0 \pm 0.8\%$ (平均値 \pm SD)、成熟果の可食部で $0.41 \pm 0.41\%$ であった。なお、毬、鬼皮と可食部の ^{137}Cs 濃度 (Bq/kg DW) 比はヤマグリ 2.2:0.8:1、'丹沢' 2.1:1.1:1 であった。

キーワード: 福島大学構内自生グリ、殻斗、 ^{137}Cs 移行率、発芽前 ^{137}Cs 汚染